

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE (REV 10-95)		ATTORNEY'S DOCKET NUMBER <b>1788</b>
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR <b>10/018932</b>
INTERNATIONAL APPLICATION NO. <b>PCT/DE 00/01629</b>	INTERNATIONAL FILING DATE <b>MAY 20, 2000</b>	PRIORITY DATE CLAIMED <b>JUNE 19, 1999</b>
TITLE OF INVENTION <b>PIEZOELECTRIC ACTUATOR</b>		
APPLICANT(S) FOR DO/EO/US <b>Friedrich BOECKING</b>		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</li> <li>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</li> <li>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2))             <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</li> </ol> </li> <li>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li> <li>7. <input type="checkbox"/> A copy of the International Search Report (PCT/ISA/210).</li> <li>8. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))             <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input type="checkbox"/> have been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>9. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li> <li>10. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).</li> <li>11. <input type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409).</li> <li>12. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).</li> </ol>		
Items 13 to 18 below concern document(s) or information included:		
<ol style="list-style-type: none"> <li>13. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</li> <li>14. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</li> <li>15. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment. A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment.</li> <li>16. <input type="checkbox"/> A substitute specification.</li> <li>17. <input type="checkbox"/> A change of power of attorney and/or address letter.</li> <li>18. <input checked="" type="checkbox"/> Certificate of Mailing by Express Mail</li> <li>19. <input type="checkbox"/> Other items or information:</li> </ol>		
		

U.S. APPLICATION NO. (IF KNOWN SEE 37 CFR 1.491)	107018952	INTERNATIONAL APPLICATION NO. PCT/DE 00/01629	ATTORNEY'S DOCKET NUMBER 1788
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20. The following fees are submitted:

**BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :**

<input type="checkbox"/> Search Report has been prepared by the EPO or JPO .....	\$930.00
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) .....	\$720.00
<input type="checkbox"/> No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) .....	\$790.00
<input checked="" type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO .....	\$1,070.00
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) .....	\$98.00

**CALCULATIONS PTO USE ONLY**

\$890.00

Surcharge of \$130.00 for furnishing the oath or declaration later than  20  30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

\$0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	7 - 20 =	0	x \$18.00	\$0.00
Independent claims	1 - 3 =	0	x \$80.00	\$0.00

Multiple Dependent Claims (check if applicable).

\$0.00

**TOTAL OF ABOVE CALCULATIONS = \$890.00**

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable).

\$0.00

**SUBTOTAL = \$890.00**

Processing fee of \$130.00 for furnishing the English translation later than  20  30 months from the earliest claimed priority date (37 CFR 1.492 (f)).

\$0.00

**TOTAL NATIONAL FEE = \$890.00**

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).

\$40.00

**TOTAL FEES ENCLOSED = \$930.00**

Amount to be: refunded	\$
charged	\$

A check in the amount of \_\_\_\_\_ to cover the above fees is enclosed.

Please charge my Deposit Account No. 19-4675 in the amount of \$930.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 19-4675 A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

STRIKER, STRIKER & STENBY  
103 EAST NECK ROAD  
HUNTINGTON, NEW YORK 11743

  
SIGNATURE

MICHAEL J. STRIKER

NAME

27233

REGISTRATION NUMBER

DECEMBER 19, 2001

DATE

10/018932  
531 Rec'd PCT/FT 19 DEC 2001

**UNITED STATES PATENT AND TRADEMARK OFFICE**

*Our Docket No.: 1788*

*In re:*

*Applicant:* BOECKING

*Serial No.:*

*Filed:*

*For:*

***SIMULTANEOUS AMENDMENT***

December 19, 2001

Hon. Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

Sir:

Simultaneously with filing of the above identified application,  
please amend the same as follows:

In the specification:

Please amend the specification as attached.

In the claims:

Cancel all claims without prejudice.

Add the following claims as attached.

REMARKS

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the specification to bring it in compliance with the requirements of the U.S. Patent Practice.

The original claims have been canceled and replaced with a new set of claims which has been drafted also in accordance with the requirements of the U.S. Patent Practice.

Consideration and allowance of present application is most respectfully requested.

Should the Examiner require or consider it advisable that the specification, claims and/or drawings be further amended or corrected in formal respects in order to place this case in condition for final allowance, then it is respectfully requested that such amendments or corrections be carried out by Examiner's Amendment, and the case be passed to issue.

Any costs involved should be charged to the deposit account of the undersigned (No. 19-4675). Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, he is invited to telephone the undersigned (at 631-549-4700).

Respectfully submitted,



Michael J. Striker  
Attorney for Applicants  
Reg. No. 27233

100-1832-12001

In the specification:

**Page 1, line 3, change the heading “Prior Art” to --**

**Background of the Invention --.**

**Amend the first paragraph on page 1 as follows:**

The invention concerns a piezoelectric actuator, e.g., to actuate a mechanical component such as a valve or the like[, according to the features-based on the general class-of the primary claim].

**On page 1, line 21, change the heading “Advantages of the Invention” to -- Summary of the Invention --.**

**After this heading please insert the following paragraph:**

-- In keeping with these objects and with others which will become apparent hereinafter, one feature of present invention resides, briefly stated in a piezoelectric actuator, comprising a multilayer structure of piezoelectric plies; internal electrodes and external electrodes, said internal

electrodes being arranged between said piezoelectric plies and having a lateral contacting in alternate direction of said internal electrodes with said external electrodes having two different polarities, two consecutive internal electrodes having a same polarity always comprise one internal electrode always having the other polarity between them and having a common contact point with their assigned external electrode, one of the two internal electrodes having the same polarity passing all the way through the piezoelectric actuator from a side of its contacting with said external electrode to an opposite side, the other internal electrode having the same polarity always terminating with clearance on a side of the piezoelectric actuator opposite to its contacting, the internal electrode passing all the way through the piezoelectric actuator terminating in a region of the piezoelectric actuator that is bridged over to prevent a short circuit of said external throat arranged there. --

**On page 3, in line 24, change the heading “Diagram” to --  
Brief Description of the Drawings --.**

**On page 4, line 8, change “Description of the Exemplary  
Embodiments” to -- Description of the Preferred Embodiments --.**

**Amended paragraph 1, on page 1:**

The invention concerns a piezoelectric actuator, e.g., to actuate a mechanical component such as a valve or the like.

**On page 1, after the heading “Summary of the Invention”,  
please insert the new paragraph:**

-- In keeping with these objects and with others which will become apparent hereinafter, one feature of present invention resides, briefly stated in a piezoelectric actuator, comprising a multilayer structure of piezoelectric plies; internal electrodes and external electrodes, said internal electrodes being arranged between said piezoelectric plies and having a lateral contacting in alternate direction of said internal electrodes with said external electrodes having two different polarities, two consecutive internal electrodes having a same polarity always comprise one internal electrode always having the other polarity between them and having a common contact point with their assigned external electrode, one of the two internal electrodes having the same polarity passing all the way through the piezoelectric actuator from a side of its contacting with said external

electrode to an opposite side, the other internal electrode having the same polarity always terminating with clearance on a side of the piezoelectric actuator opposite to its contacting, the internal electrode passing all the way through the piezoelectric actuator terminating in a region of the piezoelectric actuator that is bridged over to prevent a short circuit of said external throat arranged there. --

New claims:

8. A piezoelectric actuator, comprising a multilayer structure of piezoelectric plies; internal electrodes and external electrodes, said internal electrodes being arranged between said piezoelectric plies and having a lateral contacting in alternate direction of said internal electrodes with said external electrodes having two different polarities, two consecutive internal electrodes having a same polarity always comprising one internal electrode always having the other polarity between them and having a common contact point with their assigned external electrode, one of the two internal electrodes having the same polarity passing all the way through the piezoelectric actuator from a side of its contacting with said external electrode to an opposite side, the other internal electrode having the same polarity always terminating with clearance on a side of the piezoelectric actuator opposite to its contacting, the internal electrode passing all the way through the piezoelectric actuator terminating in a region of the piezoelectric actuator that is bridged over to prevent a short circuit of said external electrode arranged there.

9. A piezoelectric actuator as defined in claim 8; and further comprising an insulation layer applied in a region in which said internal electrode extended from a non-contacted side of the end terminates.

10. A piezoelectric actuator as defined in claim 8, wherein said external electrodes are composed of an electrically conductive material selected from the group consisting of a metal strip, a screen, and a net.

11. A piezoelectric actuator as defined in claim 8, wherein said external electrodes are composed of wave electrodes that bridge over the other internal electrode extended to an end of the piezoelectric ply and not to be contacted, at a specific distance in a shape of a wave.

12. A piezoelectric actuator as defined in claim 8, wherein said multilayer structure of piezoelectric plies is provided with an electrically insulating ceramic plate at each end of said piezoelectric plies.

13. A piezoelectric actuator as defined in claim 8, wherein said piezoelectric actuator is formed so that it is usable to actuate a mechanical component.

14. A piezoelectric actuator as defined in claim 8, wherein said piezoelectric actuator is formed as a valve.

## 1 PIEZOELECTRIC ACTUATOR

2

## 3 Prior Art

4

5 The invention concerns a piezoelectric actuator, e.g., to actuate a mechanical  
6 component such as a valve or the like, according to the features—based on the  
7 general class—of the primary claim.

8

9 It is generally known that, by utilizing the “piezoelectric effect”, a piezoelectric  
10 element can be constructed out of a material having a suitable crystal structure.  
11 When an external electrical voltage is applied, a mechanical reaction of the  
12 piezoelectric element takes place that, depending on the crystal structure and the  
13 application regions of the electrical voltage, represents a push or pull in a  
14 specifiable direction. The construction of this piezoelectric actuator can take  
15 place here in a plurality of layers (multilayer actuators), and each of the  
16 electrodes, via which the electrical voltage is applied, is arranged between the  
17 layers. When the piezoelectric actuator is operated, care must be taken to ensure  
18 that no disturbing crack formations develop in the ply structure by means of  
19 mechanical stresses.

20

## 21 Advantages of the Invention

22

23 The piezoelectric actuator described initially, which can be used to actuate a  
24 mechanical component, for example, is advantageously constructed with a  
25 multilayer structure of piezoelectric plies and electrodes arranged between them.  
26 With a lateral contacting of the electrodes in alternate directions, a neutral phase  
27 forms in the region between two piezoelectric plies in each case. Since the  
28 electrodes contacted on one side in each case are integrated in the ply structure  
29 in the manner of a comb, the consecutive electrodes in the direction of the ply  
30 build-up must be contacted on opposite sides, always in alternating fashion.

31

1 As a rule, the electrodes contacted on one side can thereby not always be  
2 extended completely to the opposite side, because voltage spark-overs could  
3 otherwise lead to the destruction of the piezoelectric actuator. When the  
4 piezoelectric actuator is operated, i.e., when a voltage is applied between the  
5 opposing electrodes in the ply structure, different mechanical forces occur in the  
6 region of the electrodes as well as in the non-contacted neutral phases, which  
7 can lead to mechanical stresses and crack formations in the piezoelectric  
8 actuator.

9

10 In an advantageous exemplary embodiment according to the invention, one  
11 electrode layer of the internal electrode that is contacted on one side is always  
12 extended completely to the end of the other side at specified intervals, and the  
13 external electrode lying on the other side in each case thereby bridges over this  
14 layer to prevent a short circuit. The contacting in alternate directions is  
15 constructed in such a fashion that two internal electrodes—that enclose an  
16 internal electrode having the opposite polarity and contacted on the opposite  
17 side—are contacted jointly on one side in each case. In alternating fashion, one  
18 of these jointly contacted internal electrodes—with formation of a neutral  
19 phase—is now not extended to the end of the piezoelectric plies in each case,  
20 and the other is extended to the end of the piezoelectric ply in each case.

21

22 A contacting with external electrodes is possible in which an insulation layer is  
23 applied in simple fashion in the region in which the other internal electrode  
24 extended on the non-contacted side to the end lies. The external electrodes can  
25 thereby be composed of an electrically conductive screen or net. The form of the  
26 external electrode can also be a simple metal strip here, and this can be  
27 composed of a conductive material with similar coefficients of thermal expansion  
28 as the ceramic material of the piezoelectric plies, e.g., invar.

29

30 In another preferred embodiment, however, the external electrodes are  
31 advantageously wave electrodes that bridge over the other internal electrode—

1 extended to the end of the piezoelectric ply and not to be contacted—at a  
2 specified distance in the shape of a wave.

3

4 With the exemplary embodiments named previously, it is therefore possible to  
5 extend every other internal electrode to the outside via partial external  
6 contacting. With this measure and a partially offset external electrode, e.g., a  
7 wave electrode which is connected only in the region of the external contacting  
8 and which has a distance of approximately 50 µm, for example, from the internal  
9 electrode not to be contacted, a short circuit can be avoided here and the  
10 expansion in the external region—by the reduction of the neutral phase—can be  
11 increased markedly overall, so that the risk of crack formation is reduced.

12

13 It is furthermore advantageous when the multilayer structure of the piezoelectric  
14 plies is provided with an electrically insulating ceramic plate on each end of the  
15 folded layers.

16

17 These and further features of preferred further developments of the invention  
18 also arise from the description and the diagrams in addition to the claims, and  
19 each of the individual features can be realized on its own or in plurality in the  
20 form of sub-combinations in the exemplary embodiment of the invention and in  
21 other fields, and can represent advantageous and patentable embodiments in  
22 themselves, for which protection is claimed here.

23

#### Diagram

25

26 Exemplary embodiments of the piezoelectric actuator according to the invention  
27 are explained using the diagram.

28

29 Figure 1 shows a sectional view through a piezoelectric actuator with a multilayer  
30 structure of plies composed of piezoelectric ceramic and having contacted

1 internal electrodes in alternate directions and external electrodes designed in the  
2 shape of a wave;  
3 Figure 2 shows a side view along the line A-A of Figure 1, and  
4 Figure 3 shows a partial sectional view of an exemplary embodiment having  
5 insulated regions in the region of each non-contacted internal electrode extended  
6 toward the outside.

7

## 8 Description of the Exemplary Embodiments

9

10 A piezoelectric actuator 1 is shown in Figure 1 that is constructed in a fashion  
11 known per se out of piezoelectric films 2 of a quartz material having a suitable  
12 crystal structure, so that, by utilizing the "piezoelectric effect" when applying an  
13 external electrical voltage to internal electrodes 3 and 4 as well as 5 and 6, etc.  
14 by way of external electrodes 7 and 8 contacted externally, a mechanical  
15 reaction of the piezoelectric actuator 1 takes place.

16

17 It is furthermore obvious in Figure 1 that the external electrodes are designed as  
18 wave electrodes 7 and 8 that are always contacted at contact surfaces 9 and 10  
19 with two internal electrodes having the same polarity. Every other internal  
20 electrode 3, 5 or 4, 6 having the same polarity in each case is continuous to the  
21 other end of the piezoelectric actuator 1 and is hereby insulated from this by  
22 means of a wave 11 of the respective external electrode 7 and 8 not to be  
23 contacted.

24

25 One electrically insulating head plate 12 and one foot plate 13 each are also  
26 applied to the external piezoelectric plies of the films 2, by means of which the  
27 entire piezoelectric actuator 1 can be insulated toward the outside.

28

29 To illustrate the exemplary embodiment according to Figure 1, a side view along  
30 A-A from Figure 1 is shown in Figure 2, in which a top view of the external

1 electrode 8 can be seen. The same components are labelled with the identical  
2 reference numerals here.

3

4 A second exemplary embodiment of a piezoelectric actuator 1 having another  
5 external contacting 16 is shown in Figure 3. A simple metal foil 14 is available  
6 here as the external electrode, which touches an insulation layer 15 applied in-  
7 between in the region of the internal electrodes 5, etc. not to be contacted. The  
8 same effect can therefore be achieved as in the exemplary embodiment  
9 according to Figures 1 and 2.

10

11

123456789101112131415161718191A1B1C1D1E1F1G1H1I1J1K1L1M1N1O1P1Q1R1S1T1U1V1W1X1Y1Z1

## Claims

1 3 1. Piezoelectric actuator with

2 4 - a multilayer structure of piezoelectric plies (2) and internal electrodes (3,

3 5 6) arranged between them,

6 7 - a lateral contacting of the internal electrodes (3, 4, 5, 6) with external

8 electrodes (7, 8; 14) in alternate directions, wherein, in the region between

9 two piezoelectric plies (2), comprises an internal electrode (3, 5 or 4, 6)

10 contacted on the opposite side in each case, a neutral phase without

11 electrode layer is available on the other side in each case, wherein

12

13 - at specified intervals, one electrode layer of the internal electrode (5, 6)

14 that is contacted (9, 10) on one side always extends completely to the end

15 of the other side, and the external electrode (7, 8) lying on the other side

16 in each case thereby bridges over this layer to prevent a short circuit.

17

18 2. Piezoelectric actuator according to Claim 1, characterized in that

19 - the contacting in alternate directions is designed in such a fashion that two

20 internal electrodes (3, 5), which enclose an internal electrode (4) having

21 opposite polarity, are contacted (10) jointly on one side in each case,

22 wherein, in alternating fashion, one internal electrode (3), with formation of

23 the neutral phase, is not extended to the end of the piezoelectric plies (2)

24 in each case, and the other (5) extends to the end of the piezoelectric ply

25 (2) in each case.

26

27 3. Piezoelectric actuator according to Claim 1 or 2, characterized in that

28 - an insulation layer (15) is applied in the region in which the other internal

29 electrode (5) extended on the non-contacted side to the end lies.

30

31 4. Piezoelectric actuator according to Claim 3, characterized in that

1 - the external electrodes (14) are composed of an electrically conductive  
2 metal strip, a screen, or net.

3

4 5. Piezoelectric actuator according to Claim 1, 2 or 3, characterized in that  
5 - the external electrodes are composed of wave electrodes (7, 8) that bridge  
6 over the other internal electrode (5, 6)—which is extended to the end of  
7 the piezoelectric ply (2) and is not to be contacted—at a specified distance  
8 in the shape of a wave.

9

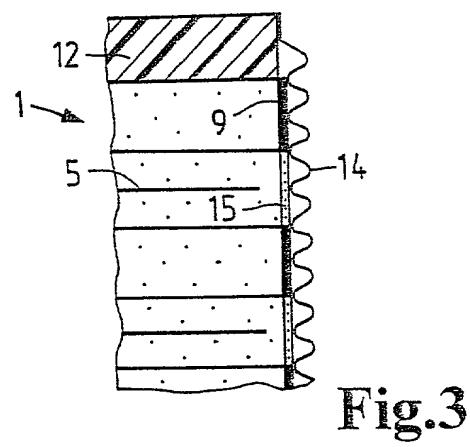
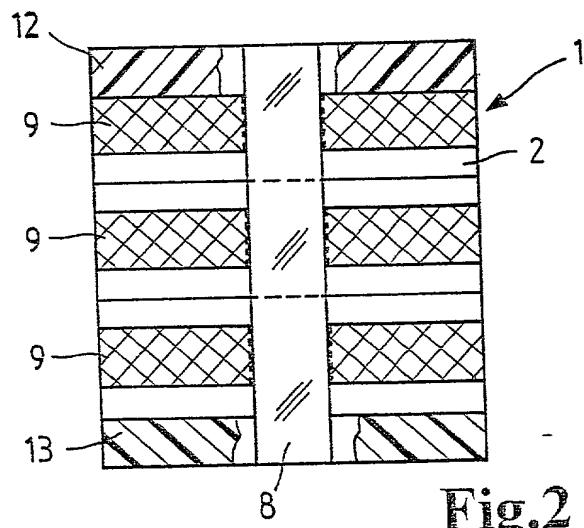
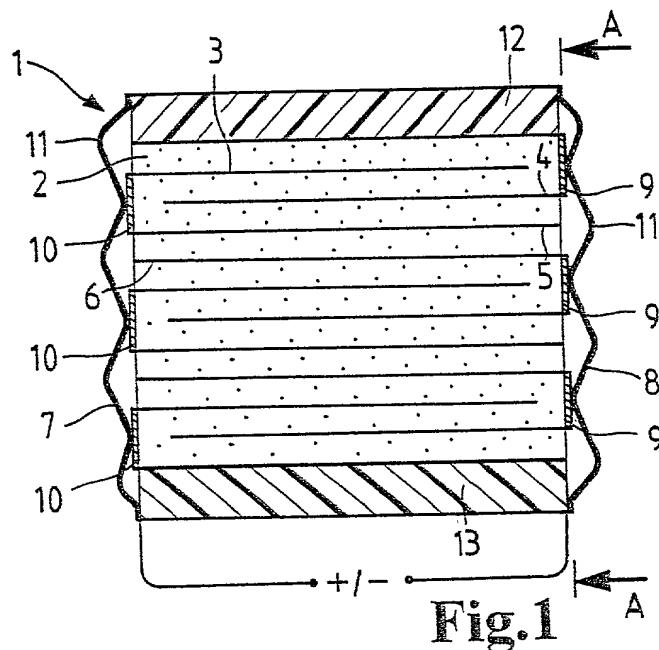
10 6. Piezoelectric actuator according to one of the preceding claims,  
11 characterized in that  
12 - the multilayer structure of piezoelectric plies (2) is provided with an  
13 electrically insulating ceramic plate (12, 13) on each end of the folded  
14 layers.

15

16 7. Piezoelectric actuator according to one of the preceding claims,  
17 characterized in that  
18 - the piezoelectric actuator (1) for actuating a mechanical component can  
19 be used like a valve or the like.

100-130-202-120-00

1 / 1



**DECLARATION AND POWER OF ATTORNEY FOR NATIONAL STAGE OF PCT PATENT APPLICATION**

As a below-named inventor, I hereby declare that:

Friedrich BOECKING

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **PIEZOELECTRIC ACTUATOR** the specification of which was filed as PCT International Application number PCT/DE 00/01629 on May 20, 2000.

I hereby state that I believe the named inventor or inventors in this Declaration to be the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365 (b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

<u>Prior foreign application(s):</u>	<u>Priority claimed:</u>			
199 28 187.4-35 (Number)	GERMANY (Country)	JUNE 19, 1999 (Date filed)	X Yes	— No
— (Number)	— (Country)	— (Date filed)	— Yes	— No

As a named inventor, I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Michael J. Striker, Reg. No. 27233

Direct all telephone calls to Striker, Striker & Stenby at telephone no.: (631) 549 4700 and address and all correspondence to:

STRIKER, STRIKER & STENBY  
103 East Neck Road  
Huntington, New York 11743  
U.S.A.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statement may jeopardize the validity of the application or any patent issued thereon.

Signature: 	Date: X 14. 8. 01	Residence and Full Postal Address: Mainzer Strasse 27 70499 Stuttgart Germany
Full Name of First or Sole Inventor: <u>Friedrich BOECKING</u>	Citizenship: GERMAN 	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Second Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Third Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Fourth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Fifth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Sixth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Seventh Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Eighth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Ninth Inventor:	Citizenship:	